

# Packages used by major linux distributions

Michael Kluge

June 25, 2013

# Meaning of different box colors

/path/to/some/file

Content of the file or just parts of it.

Shell commands

Can be executed on the shell.

Green box definition

Definitions or examples.

# Introduction

# What is a package?

## Opensuse package definition

Packages are **archives of files** that include **all the files** making up a **piece of software** and, eventually, instructions on the way to make them work.



[http://en.opensuse.org/Package\\_management](http://en.opensuse.org/Package_management)

## Debian FAQ definition

Packages generally contain **all of the files** necessary to implement a set of related **commands or features**.



[http://www.debian.org/doc/manuals/debian-faq/ch-pkg\\_basics.en.html](http://www.debian.org/doc/manuals/debian-faq/ch-pkg_basics.en.html)

# How to install a package without a package manager?

- ▶ tarball is an gzipped tar archive (tar.gz file)
- ▶ normally contains source code and a makefile
- ▶ but content is not standardized and may be different
- ▶ common method before package management systems emerged

unpack, configure, compile & install

```
tar -xzf node-v10.12.tar.gz  
cd node-v10.12  
./configure  
make  
make install
```

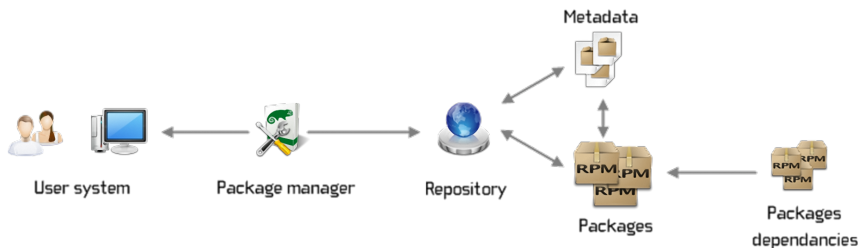
# Pros & cons

- + source code can be modified by user
- + can be used to install tools which are not packaged
- not standardized
- no integrity check
- may have no uninstaller
- no automatic updates
- no automatic dependency resolution or even checking
- dependencies may be included and installed twice

# Package management systems

# What functions may a package manager has?

- ▶ keep track of all installed packages
- ▶ install, update and removal of packages
- ▶ often offers meta data about packages
- ▶ downloads packages from the repositories
- ▶ checks integrity of packages after download
- ▶ automatic dependency resolution





# Mostly used package formats

## RPM Package Manager: .rpm

- ▶ created by Red Hat Linux
- ▶ used by Red Hat, SUSE, Fedora and derivatives
- ▶ package manager: rpm

## Debian binary package format: .deb

- ▶ created by Debian
- ▶ used by Debian, Knoppix, Ubuntu and derivatives
- ▶ package manager: dpkg (**d**ebian **p**ackage)

There are some other systems like stampede slp (dead since 2002), slackware tgz or pacman packages.

# RPM Package Manager

- ▶ database with metainfo and history of installed packages in `/var/lib/rpm`
- ▶ naming convention:  
`<name>-<version>-<release>.<architecture>.rpm`
- ▶ binary format contains four sections:
  - ▶ RPM lead
  - ▶ signature to ensure integrity and authenticity
  - ▶ header with metadata (f.e. name, version, architecture)
  - ▶ file archive (cpio compressed with gzip)
- ▶ front ends: yum, up2date, zypper and apt-rpm

# Debian binary package format

- ▶ database with metainfo and older version as backup in `/var/lib/dpkg`
- ▶ naming convention:  
`<name>_<version>-<revisionNumber>_<architecture>.deb`
- ▶ binary format (ar archive) contains three sections:
  - ▶ `debian-binary`: series of lines; currently only the version number
  - ▶ `control.tar.gz`: package control information (plain text files)
  - ▶ `data.tar.gz`: filesystem as a tar archive (compression depends on version)
- ▶ front ends: `apt`, `synaptics` and `aptitude`

# Basic commands in rpm & dpkg

install

```
rpm -i package.rpm
```

install

```
dpkg -i package.deb
```

update

```
rpm -U package.rpm
```

update

```
dpkg -i package.deb
```

remove

```
rpm -e package.rpm
```

remove

```
dpkg -r package.deb
```

list installed package

```
rpm -qa
```

list installed package

```
dpkg -l [regex]
```

## Wrong package format? (I)

- ▶ create package with **checkinstall**
  - ▶ monitors, which files are changed during installation and creates a package out of that information
  - ▶ may overwrite existing files while the package is created

using checkinstall to create a package from source

```
apt-get install checkinstall  
tar -xzf node-v10.12.tar.gz  
cd node-v10.12  
./configure  
make  
checkinstall --bk make install
```

results in two files

```
node_0.10.12-1_amd64.deb  
backup-062120131441-pre-node.tgz
```

## Wrong package format? (II)

- ▶ try to convert it with **alien**
  - ▶ converts between rpm, deb, stampede slp and slackware tgz
  - ▶ is experimental software therefore has limitations and bugs
  - ▶ should not be used to replace important system packages

### package conversion with alien

apt-get install alien

alien --to-deb /path/to/package.rpm

alien --to-rpm /path/to/package.deb

- ▶ install from source using **stow**
  - ▶ stow is a symlink farm manager
  - ▶ useful for keeping track of software built from source

## Wrong package format? (III)

### install nodejs using stow

```
apt-get install stow  
tar -xzf node-v10.12.tar.gz  
cd node-v10.12  
./configure --prefix=/usr/local/stow/node_v10.12  
make  
make install  
cd /usr/local/stow/  
stow -S node_v10.12
```

### uninstall nodejs using stow

```
cd /usr/local/stow/  
stow -D node_v10.12  
rm /usr/local/stow/node_v10.12 -r
```

# Debian packaging directives



# Debian Social Contract (I)

- ▶ producers of the Debian system created the Debian Social Contract
- ▶ version 1.0 on 05.06.1997
- ▶ version 1.1 on 26.04.2004
- ▶ "this resolution only changes the letter of the law, not the spirit"
- ▶ "Debian Free Software Guidelines" (DFSG) was used as basis of the "Open Source Definition" created by the "Open Source Initiative"

# Debian Social Contract (II)

- ▶ *Debian will remain 100% free*
  - ▶ debian system and all its components will stay free
  - ▶ free refers to "The Debian Free Software Guidelines" (DFSG)
  - ▶ non-free components will never be obligatory

# Debian Social Contract (II)

- ▶ *Debian will remain 100% free*
  - ▶ debian system and all its components will stay free
  - ▶ free refers to "The Debian Free Software Guidelines" (DFSG)
  - ▶ non-free components will never be obligatory
- ▶ *We will give back to the free software community*
  - ▶ new components will be licensed according to the DFSG
  - ▶ developers will be informed about bugs and user requests

# Debian Social Contract (II)

- ▶ *Debian will remain 100% free*
  - ▶ debian system and all its components will stay free
  - ▶ free refers to "The Debian Free Software Guidelines" (DFSG)
  - ▶ non-free components will never be obligatory
- ▶ *We will give back to the free software community*
  - ▶ new components will be licensed according to the DFSG
  - ▶ developers will be informed about bugs and user requests
- ▶ *We will not hide problems*
  - ▶ public bug reporting and instant publishing of bugs

# Debian Social Contract (II)

- ▶ *Debian will remain 100% free*
  - ▶ debian system and all its components will stay free
  - ▶ free refers to "The Debian Free Software Guidelines" (DFSG)
  - ▶ non-free components will never be obligatory
- ▶ *We will give back to the free software community*
  - ▶ new components will be licensed according to the DFSG
  - ▶ developers will be informed about bugs and user requests
- ▶ *We will not hide problems*
  - ▶ public bug reporting and instant publishing of bugs
- ▶ *Our priorities are our users and free software*
  - ▶ interests of users are first priority
  - ▶ free use of debian and other components in distributions

# Debian Social Contract (II)

- ▶ *Debian will remain 100% free*
  - ▶ debian system and all its components will stay free
  - ▶ free refers to "The Debian Free Software Guidelines" (DFSG)
  - ▶ non-free components will never be obligatory
- ▶ *We will give back to the free software community*
  - ▶ new components will be licensed according to the DFSG
  - ▶ developers will be informed about bugs and user requests
- ▶ *We will not hide problems*
  - ▶ public bug reporting and instant publishing of bugs
- ▶ *Our priorities are our users and free software*
  - ▶ interests of users are first priority
  - ▶ free use of debian and other components in distributions
- ▶ *Works that do not meet our free software standards*
  - ▶ is not part of the debian system
  - ▶ but will be supported and provided in archive areas '*contrib*' and '*non-free*'

# Debian Free Software Guidelines (DFSG)

- ▶ free redistribution
- ▶ distribution with included source code
- ▶ allowing for modifications and derived works
- ▶ integrity of the author's source code
- ▶ no discrimination against persons or groups
- ▶ no discrimination against fields of endeavor
- ▶ license needs to apply to all to whom the program is redistributed
- ▶ license must not be specific to Debian
- ▶ license must not contaminate other software
- ▶ GNU GPL, BSD, and Artistic licenses are examples of licenses considered free

# Debian Policy Manual

describes the debian archive, technical requirements a package must satisfy and the operating system

- ▶ debian archive areas
- ▶ packages
  - ▶ binary packages
  - ▶ source packages
  - ▶ relationships between packages
- ▶ operating system
  - ▶ file system
  - ▶ users and groups
  - ▶ run levels
  - ▶ cron jobs
  - ▶ and much more
- ▶ documentation



# Archive areas in Debian

## ▶ *main*

- ▶ only *main* area is part of the debian distribution
- ▶ may not require software outside of *main* for compilation or execution
- ▶ anyone may use, share, modify and redistribute the packages freely
- ▶ must comply with the DFSG
- ▶ must meet all debian policy requirements

# Archive areas in Debian

## ▶ *main*

- ▶ only *main* area is part of the debian distribution
- ▶ may not require software outside of *main* for compilation or execution
- ▶ anyone may use, share, modify and redistribute the packages freely
- ▶ must comply with the DFSG
- ▶ must meet all debian policy requirements

## ▶ *contrib*

- ▶ requires software outside of *main*
- ▶ must comply with the DFSG
- ▶ must meet all debian policy requirements

# Archive areas in Debian

## ▶ *main*

- ▶ only *main* area is part of the debian distribution
- ▶ may not require software outside of *main* for compilation or execution
- ▶ anyone may use, share, modify and redistribute the packages freely
- ▶ must comply with the DFSG
- ▶ must meet all debian policy requirements

## ▶ *contrib*

- ▶ requires software outside of *main*
- ▶ must comply with the DFSG
- ▶ must meet all debian policy requirements

## ▶ *non-free*

- ▶ do not comply with the DFSG
- ▶ may be protected by patents
- ▶ must meet all debian policy requirements as far as possible

# Archive areas in Debian

## ▶ *main*

- ▶ only *main* area is part of the debian distribution
- ▶ may not require software outside of *main* for compilation or execution
- ▶ anyone may use, share, modify and redistribute the packages freely
- ▶ must comply with the DFSG
- ▶ must meet all debian policy requirements

## ▶ *contrib*

- ▶ requires software outside of *main*
- ▶ must comply with the DFSG
- ▶ must meet all debian policy requirements

## ▶ *non-free*

- ▶ do not comply with the DFSG
- ▶ may be protected by patents
- ▶ must meet all debian policy requirements as far as possible

Too buggy packages are not included in any area!

# How to choose which repositories should be used?

- ▶ `/etc/apt/sources.list` controls which repositories are used by apt
- ▶ syntax: `type location distribution [components]`

example out of `/etc/apt/sources.list`

```
deb http://ftp.de.debian.org/debian wheezy main contrib non-free
```

- ▶ reload package repositories after changes

reload package repositories

```
apt-get update
```

# References (I)

[1] Package management in opensuse

[http://en.opensuse.org/Package\\_management](http://en.opensuse.org/Package_management)

[2] Packages in Debian

[http://www.debian.org/doc/manuals/debian-faq/ch-pkg\\_basics.en.html](http://www.debian.org/doc/manuals/debian-faq/ch-pkg_basics.en.html)

[3] Different Linux distributions

[http://en.wikipedia.org/wiki/List\\_of\\_Linux\\_distributions](http://en.wikipedia.org/wiki/List_of_Linux_distributions)

[4] Different package manager

<http://linuxappfinder.com/system/packagemanagers>

[5] RPM Package Manager

[http://en.wikipedia.org/wiki/RPM\\_Package\\_Manager](http://en.wikipedia.org/wiki/RPM_Package_Manager)

[6] Checkinstall

<http://asic-linux.com.mx/~izto/checkinstall/>

## References (II)

[7] Alien

<http://joeyh.name/code/alien/>

[8] Stow

<http://www.gnu.org/software/stow/>

[9] Debian Social Contract

[http://www.debian.org/social\\_contract](http://www.debian.org/social_contract)

[10] The Debian Free Software Guidelines

[http://www.debian.org/social\\_contract#guidelines](http://www.debian.org/social_contract#guidelines)

[11] Debian Policy Manual

<http://www.debian.org/doc/debian-policy/>

[12] Archive areas

<http://www.debian.org/doc/debian-policy/ch-archive.html#s-sections>